
Encomium: Oswaldo Frota-Pessoa

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INTRODUCTION

Oswaldo Frota-Pessoa has a realistic appreciation of his professional life and accomplishments in over a half-century of work in human genetics; nevertheless, it took a determined effort over several years for him to produce the Living-History Autobiography, for which we are happy to provide an encomium-Geleitwort.

ANGELA M. VIANNA-MORGANTE OF SÃO PAULO

My fondness and admiration for Frota (as he is known to his friends) are of long standing. Our first meeting was 27 years ago when I arrived at the University of São Paulo for graduate school. The warmth and good will with which I was received eased my first moments as a new arrival, and my fears of an unknown environment were soon dispelled. It was at this first meeting that Frota bombarded me with questions that went right to the heart of the matter; with a crushing objectivity that left no room for wavering or false modesty, he led me into a self-analysis, a precise evaluation of my performance as an undergraduate and my goals in pursuing graduate studies. It was my first contact with Frota the rationalist, as he sometimes refers to himself. His capacity to resolve problems by delineating the steps, analyzing each systematically, drawing conclusions, and injecting them into a more global context is coupled with an ability to express his thoughts economically and elegantly, with a choice of words, appropriate for his audience, flowing naturally. This unfolding of logical reasoning has characterized his scientific papers and textbooks and has made him a wonderful science educator, an activity justly recognized when he was awarded the prizes José Reis, here in Brazil, and Kalinga, by UNESCO.

We, his students (and there have been many: 32 completing their master's degree, and 15 their doctorates), soon learned that, to defend an idea contrary to Frota's, we had to begin the discussion armed with crystal-clear arguments and be prepared for a long tournament in

which clarity, persistence, and patience were essential. Not that he was obstinate in his positions, but simply that, as a good devil's advocate, he required that his opponents offer arguments strong enough to refute his or endeavor to understand the essence of his reasoning. Some of these sessions we won, many others we lost, but principally we received an enviable training in the art of argumentation. Many of us learned in these exercises to control our emotions and react exclusively with reason. Unfortunately, I was never able to attain the level of perfection of the master, who frequently throughout the years toasted me with, "Don't be emotional, my child." But I did progress. I also came to understand that permeating all his rationalism, there exists in Frota a great sensibility, providing him with a feeling for and comprehension of other persons, helping them when he feels that he is able to help, and never demanding of them more than their capacity allows.

This ability of Frota for interacting with people is manifested clearly when he converses with patients, explaining to them the magnitude of their genetic risks or the cause of the defects present in one of their children. Frota began the Service for Genetic Counseling in the Department of Biology at the Universidade de São Paulo in 1966. During a span of almost 30 years, about 14,000 families have been seen by the original nucleus created by Frota and continued today by Dr. Paulo A. Otto and myself. Another 10,000 families have been cared for in the muscular dystrophy clinic, which has become autonomous under the direction of Dr. Mayana Zatz.

But Frota's road to human and medical genetics began with the taxonomy and description of 15 species of *Drosophila* of the *tripunctata* group, which was the theme of his Ph.D. dissertation at the Universidade do Distrito Federal in Rio de Janeiro in 1953. During the next two years, *Drosophila* remained his main interest as he worked with Th. Dobzhansky as a Rockefeller Foundation Fellow at Columbia University. However, it was during this period that his first flirtation with human genetics occurred when, after being alerted by a student, he investigated the reason for the high frequency of deafness in the local population in Planaltina, Goiás, Brazil. But his true inspiration came from Newton Freire-Maia, the pioneer of human genetics in Brazil, who, as Frota tells it, wrote for him the Dahlberg formula in the sands of Flamengo beach

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in Rio de Janeiro, and from which he embarked on his studies of isolates. This research culminated in a Private Docent thesis presented in 1963 to the University of São Paulo, where he had arrived in 1958 by invitation of Professor Crodowaldo Pavan. Frota was now definitely in human genetics and, as happened with most human geneticists of that time, his *Drosophila* background led him to population genetics.

The year 1964 found him in Madison, Wisconsin with Dr. James F. Crow. There he had the opportunity not only to continue with his population work but to acquire additional training in cytogenetics. Drs. Klaus Patau and Eeva Therman, greatly respected by human cytogeneticists, were members of the laboratory. Dr. John M. Opitz, who applied cytogenetics to the diagnosis of genetic diseases, shared an office with Frota. Upon returning to Brazil, Frota began his chromosome era, although his work was not restricted to medical applications. Under his inspiration a group interested in the evolutionary cytogenetics of vertebrates was formed which is now, under the direction of Dr. Yatiyo Yassuda, one of the most important lines of research in the Department of Biology, at the Universidade de São Paulo.

The Genetic Counseling Service created by Frota was not purely a public service facility. Graduate students in medical and biological areas received training there and become involved in scientific research. Under Frota's guidance, eight medical doctors obtained master's degrees, and five their Ph.D. in medical genetics. It was this contribution of Frota to basic research in medicine that prompted the Brazilian National Academy of Medicine to award him the Alfred Jurzikowski Prize in 1989.

Actually, my first encounter with Frota occurred 2 years before my arrival in São Paulo, although at the time he was unaware of it. I was enrolled in college and had begun to teach classes in a secondary school. At this point I was certain that my choice of biology was predominantly gene-orientated, since the environmental effect, through the manner in which I was taught biology, could only have instilled a loathing in me for the subject. Nothing could have been more abstract: texts and more texts to be memorized and cursed. When I finally had my own students, I resolved to try and do things differently. My inexperience, however, was total. It was at this point that I encountered Frota-Pessoa in the form of his book, *Biology in Secondary School*, from which I learned how to teach. I discovered the importance of raising a problem to engage the students, and of presenting facts and concepts through discussion. I don't know how many biologists I may have launched, but certainly my classes were fun and both the students and I learned a great deal.

The teaching of science was always a great concern of Frota. His book, *Biology in Secondary School*, was a milestone for students and teachers in the 1960's and 1970's. His books on how science should be taught have had ample distribution in Brazil and Latin America. Even now the "guru" Frota-Pessoa continues teaching how to teach, traveling the length and breadth of Brazil giving conferences, roundtable discussions, and his brand of classes.

ELIANE S. AZEVÊDO OF BAHIA

My first meeting with Dr. Oswaldo Frota-Pessoa in 1962, at the Department of Biology in the University of São Paulo, was through Dr. Newton Morton. At this time Dr. Morton was preparing an extensive investigation to be carried out in Brazil and was occupying an office offered to him by Frota, who not only placed the material infrastructure of the Department at his disposal, but collaborated in various aspects of discussions referring to the project. The presence of Frota in this scene was marked by the creativity of his suggestions, his enthusiasm for the research, his spirit of criticism, the logic of his thinking and the firmness of his opinions, and his extensive knowledge in population genetics. Since this first contact I have considered him an exemplary research and professor. His dynamic and intriguing way of discussing science rivets his audience's attention, causing them to evolve in accompaniment to his explanations, thoughts, conclusions, and, almost always, his new ideas for research.

Since 1962 I have been afforded many opportunities to be with Frota. My first impressions of him have been enhanced along the way, and I shall now briefly describe some of his other attributes:

- 1) A deep concern with the teaching of science on the primary and secondary levels, which prompted him to write various scientific textbooks in a form easily accessible to young children and adolescents.

- 2) An ability to describe complex scientific problems in a manner appealing to the general public, and in this way demonstrating an unusual competence for scientific instruction.

- 3) A creative way of thinking, with brilliant and practical ideas clearly expressed, to investigate challenging problems in human genetics.

- 4) The ability to listen attentively and earnestly to students, and to accept those ideas and suggestions which are appropriate without imposing his authority as professor and researcher.

- 5) The readiness to accept the responsibility for students from other Brazilian universities with less status than the University of São Paulo, and to invest with rigor and enthusiasm in the training of these students. The field of education in Brazil at the graduate level owes much to Frota for his efficient role in forming young researchers. A vast number of his former students, prepared with good academic and scientific formation, are now teaching in local universities, and are producing a new generation of researchers in the North and Northwest regions of the country.

- 6) A diversity in the areas of education and genetics, demonstrating his capacity to use his time in a most efficient and productive way. His numerous publications in the Brazilian and international literatures indicate the level of activity that he has maintained in these areas.

- 7) The admirable quality that his accomplishments have been executed in the best possible way. The scientific works of Frota have been published in the foremost international scientific journals, thus bringing to the

world scientific community the names of the University of São Paulo and of Brazil.

8) His availability, in response to the many requests to give courses, present seminars, attend conferences, etc., in any part of Brazil and Latin America, has made Frota a continental educator. It is almost impossible to imagine that there exists in Brazil a teacher of science or a graduate student of genetics who has not had the opportunity to hear Frota in one of his talks, which invariably terminate with him surrounded by a bevy of students in search of explanations, discussions, and even suggestions about their professional futures.

9) The importance of Frota as an educator is not restricted to the transmission of scientific information but is characterized by the elegant way in which he resides in the scientific community, allowing his light to shine without in any way diminishing the light of his colleagues. Consequently, Frota not only forms competent researchers but also forms researchers with integrity.

PAULO A. OTTO OF SÃO PAULO

The following lines that I read at the ceremony during which Oswaldo Frota-Pessoa was granted the title professor emeritus of the University of São Paulo reflect not only my impression of him but also of those who have had the unique and gratifying opportunity of working with him and learning from him.

The word "emeritus," according to the dictionary, means "retired from active service . . . but retaining one's rank or title." My Portuguese dictionary lists the following additional meanings: "sage, very learned in a science or art, distinguished." These meanings well define Professor Oswaldo Frota-Pessoa in a rather obvious or notorious manner.

A sage (Goethe, in *Elective Affinities*) once said that there is no hero for a valet, who can only appreciate his peers. It follows, therefore, that only a hero can recognize a hero. Reductio ad absurdum, the incredibly complex, human, and dynamic personality of Oswaldo Frota-Pessoa can only be truly appreciated by himself.

But surely Nietzsche's lines in the short poem "Ecce Homo," quoted below from a plain prose translation found in the compilation by Forster [1959], describe him perfectly:

Yes, I know where I spring from!

Unsated like the flame I glow and consume myself.

Everything I grasp turns to light,

Everything I leave to cinder,

Flame is certainly what I am!

JOHN M. OPITZ OF HELENA, MONTANA

During 36 years of professional life I have been privileged to know and to work with many outstanding geneticists. Sharing an office with Oswaldo Frota-Pessoa in 1964 was one of the most important and stimulating events during my early days as a faculty member at the University of Wisconsin, and one which I recall here with deep affection and gratitude. Frota surely was and

still is a critical thinker, but was so little without prejudice about clinicians and morphologists and so humanly accessible and curious about my work, ideas, approach to biology, and myself as a person, that I was finally beginning to feel less under siege and to enjoy life in the Genetics Building. Frota was then and still is unconventional, spontaneous, enthusiastic, and enormously energetic; his personal charm and magnetism caught immediate attention and drew a response and openness from even the most dour and reserved of his fellow creatures. His brilliant intelligence, warmth, handsomeness, timbre of voice, and charisma were his most effective means of commanding respect, affection, and collaboration in personal and professional relationships. Frota's gifts were infinitely more a benediction than the overpowering talents of his peers; they were given spontaneously, freely, and joyfully, and were seasoned with a warm laugh, a sense of humor, and an understanding of the foibles of humanity.

Frota was the first colleague to encourage my thinking about developmental fields with the same enthusiasm that he devoted to all other branches of biology. He recognized and accepted me as a fellow naturalist, delighted with the fact that I was, and still am, a "card-carrying" zoologist who did clinical morphology from an evolutionary perspective. These affinities made it possible for us to begin ordering developmental phenomena in a more rational rather than intuitive manner. Frota and I spent many hours discussing the developmental attributes of syndromes and malformations. For every concept I brought up, he developed a logical approach. Until recently I still had our many pages of notes on the concept of the "phenotypic spectrum," which he dissected into the attributes of 1) number of anomalies per patient, 2) types of anomalies, 3) combination of anomalies per patient, 4) grading or severity of anomalies, and 5) natural history of individuals (or combinations of anomalies) on a time scale. It was in working with concrete examples, e.g., of my Down syndrome patients, that he began to point out to me certain regularities and close correlations that he thought might be the numerical-statistical equivalents or analogs of fields. Thus, "now see here . . . put, what you call Dubois sign, clinodactyly, and single flexion crease next to each other in your distribution of combinations of anomalies per patients; and, since they are such highly correlated attributes of a small anatomical region we will surely find a *consistent single* anatomical attribute that will explain shortness, curvature, and likelihood of one (vs. two) flexion creases." A careful reading of the work of the late Bertil Hall [1964] of Sweden quickly showed what that attribute was and, to our delight, demonstrated at least one other correlation, i.e., hypoplasia and medial wedging of the second phalanx of the fifth digit as an attribute of that digit's developmental maturation and growth before birth. In retrospect, it is evident that these discussions related more to attributes of pleiotropy than of fields; nevertheless, they were so inspiring and supportive that they found their reflection in the review by Opitz et al., [1969] on "The Study of Malformation Syndromes in

Man, presented at the First Conference on the Delineation of Birth Defects in 1968.

Frota has always lived too much in the present to make a serious historian, except to appreciate the historicity of all of biological phenomena. Frota complemented wonderfully the Brazil of natural history I know from von Humboldt, Darwin, and Bates with the one of history and culture represented not only by himself but also by Anita Wajntal and that unlikely adoptive Brazilian Charley Cotterman. Newton Morton probably has the facts in his files; but the story transmitted to me by Charley was that upon arrival of the Morton expedition in Brazil, Charley "jumped ship," bought himself a good guitar, learned to play it, many bossa nova songs, and the Portuguese language in a few days, and added substantially to the collection of leguminous seeds used in his later studies of hemagglutination and blood grouping before rejoining Morton's group. Some of the most wonderful memories I have of Madison, Wisconsin are the evenings spent mostly in Frota's apartment, and rarely at Charley's house, listening to those two make music unmatched in enthusiasm, but Frota with the more mellifluous voice and practiced guitar technique. Charley never ceased marvelling at Frota being a brother of Antonio Carlos Jobim's stepfather; and long after Frota, Betty, and Vanessa left Madison, his favorite song remained "I Garota de Ipanema," a song he played me for one last time in Madison shortly before Charley died.

Very few in Madison exposed daily to Frota's sparkle, ebullience, and energy knew that there was in fact a profoundly serious, sensitive, and caring nature to his personality. When it became impossible to manage some of Vanessa's problems at home, Frota turned to me for help in evaluating her and in devising a care pro-

gram. The admission of a terrified, handicapped little girl to a university children's hospital where no one spoke her language was eased by Betty and Frota, parents of a child who became one of my all-time most beloved patients. It is a truly extraordinary tribute to Frota's scientific generosity and magnanimity of spirit that he not only permitted but encouraged publication of her condition and of cytogenetic findings in the paper by Schinzel et al. [1981].

It is only fitting that the Ninth International Congress of Human Genetics will be held this August in Rio de Janeiro, in part a welcome opportunity to recognize the major driving force in the creation of medical genetics in South America and the enormous contribution that have been made in this field and in biology education by Oswaldo Frota-Pessoa and his many students and coworkers.

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REFERENCES

- Forster L (1959): "The Penguin Book of German Verse." Harmondsworth: Penguin Books.
- Hall B (1964): Mongolism in newborns. *Acta Paediatr Scand* [Suppl] 154:1.
- Opitz JM, Herrmann J, Dieker H (1969): The Study of Malformation Syndromes in Man I. *BD:OAS V* (2):1-10.
- Schinzel A, Schmid W, Fraccaro M, Tiepolo L, Zuffardi O, Opitz JM, Lindsten JL, Zetterquist P, Enell H, Baccichetti C, Tenconi R, Pagon RA (1981): The "cat eye syndrome": dicentric small marker chromosome probably derived from a no. 22 (tetrasomy 22pter→q11) associated with a characteristic phenotype. *Hum Genet* 57:148-158.